

THE GENUS *PERICHASMA* (MENISPERMACEÆ)

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KUNDU B. C. & SUHITA GUHA. — 21.10.1977. The genus *Perichasma* (Menispermaceae), *Adansonia*, ser. 2, 17 (2) : 221-234. Paris. ISSN 0001-804X.

ABSTRACT : The genus *Perichasma* was established by MIERS with only one species, *P. latifolata* Miers. But later, different authors treated it as *Stephania latifolata*, except PELLEGRIN who has retained the original name in Flora Mayombe. In view of this controversy, many specimens of this taxon obtained from different localities have been carefully studied. Our observations based on morphology, anatomy and palynology support the retention of the genus *Perichasma*. Beside *P. latifolata* var. *latifolata*, a new variety, var. *obovata* Kundu & Guha and a new species, *P. miersii* Kundu & Guha are described in this paper.

RÉSUMÉ : Le genre *Perichasma* a été créé par MIERS, sur une seule espèce, *P. latifolata* Miers. Par la suite, la plupart des auteurs ont attribué cette espèce au genre *Stephania*, à l'exception de PELLEGRIN qui lui conserve son nom original dans la Flore du Mayombe. L'étude morphologique, anatomique et palynologique de nombreux spécimens provenant de différentes localités confirme la nécessité de conserver le genre *Perichasma*. Une variété nouvelle *P. latifolata* var. *obovata* Kundu & Guha, et une espèce nouvelle, *P. miersii* Kundu & Guha sont également décrites.

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The genus *Perichasma* was established by MIERS (1866, 1871), with only one species, *P. latifolata* Miers. This species offers many peculiar characters although the number of its floral parts corresponds with that of *Stephania*. MIERS states that this plant differs from *Stephania* in many characters: « Its slender branches, with very distant axils, are furnished with long, patent, simple hairs...; its leaves are larger, and though peltate, are pilose on both sides and their margins are furnished with a strong marginal nerve, which is indented into several rounded lobes or large crenatures and they are supported upon unusually long slender petioles... The inflorescence is a very slender pendent raceme a foot and a half long with numerous distant, short alternate branches, which are again alternately divided; in all these respects the general habit of the plant is more in harmony with some species of *Cyclea*... It is, however, in the structure of the stamen that this genus differs essentially from *Stephania*; in the latter genus the anther has three or six cells, connate so as to form a ring, affixed on the margin of a peltate disciform connective, which is supported on the central filaments; these cells always burst bivalvately by a crenated horizontal line of sutures. In *Perichasma* the anther has no connective, is comparatively large, completely globular, simply 1-celled and dehisces

by a somewhat small apical opercular valve, which is supported by a columella-like extension of the filament... »

MIERS described only one species under the genus *Perichasma*, namely *P. lætificata*. Its habit resembles more that of *Anamirta* or *Cyclea* and its floral structure has some resemblance with that of *Stephania*.

BENTHAM & HOOKER (1867) in their *Genera Plantarum*, discussed this genus and placed it under the genus *Stephania*. OLIVER (1868) was doubtful about its identity and included it in *Flora of Tropical Africa* as *Stephania lætificata* (?). DURAND & SCHINZ (1898), DIELS (1910), EXELL & MENDONÇA (1937) and HUTCHINSON & DALZIEL (1927) treated it as *Stephania lætificata* (Miers) Oliver. TROUPIN (1962) treated it as *Stephania lætificata* (Miers) Benth.

DIELS (1910) merged the genus *Perichasma* with *Stephania* and treated the species as *S. lætificata* (Miers) Oliver, under sect. I *Perichasma*. His description of *S. lætificata* differs from *P. lætificata* of MIERS in the following characters:

- 1) Anthers dehisce transversely (according to MIERS anthers dehisce by apical opercular valve).
- 2) Sepals obovate (oblong according to MIERS).
- 3) Petals obcordate or obtriangular (orbicular according to MIERS).

DIELS notes that MIERS' observations are from imperfect flowers and are erroneous, that in the normal flowers anther structure is scarcely different from the type of *Stephania*. But our observation agrees with that of MIERS except that we do not find unilocular sporangia.

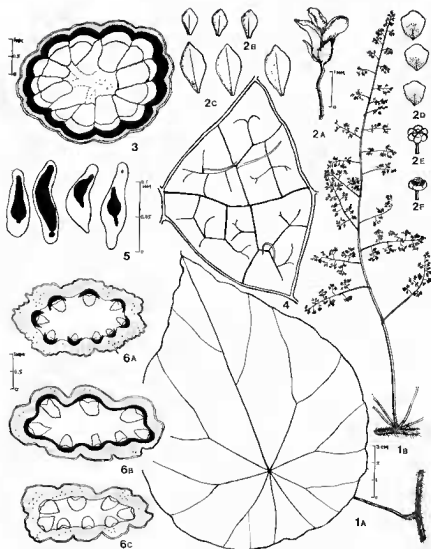
In another note, DIELS states that in *Zenker 3130* and *3130 A* the flower structure differs, "outer sepals more constricted at apex than the inner sepals and subrecurved (somewhat recurved), small, less than half, petals subovate. These characters are not at all normal and appear to be teratological variation." We have examined *Zenker 3130*. In this specimen the outer sepals are more or less normal but the inner sepals have rounded apices. The shape of the petals also differs from the normal *P. lætificata*. But these differences do not seem to be due to teratological variation.

In view of the differences in the descriptions of this plant we have carefully examined many specimens from the Cameroons, Belgian Congo, Angola, Nigeria etc. and our study supports MIERS in the separate treatment of the genus *Perichasma*. Besides, several collections have been found to be quite distinct from the type species (*P. lætificata*).

In this paper the original genus *Perichasma* is reinstated and in addition to *P. lætificata* Miers one new species, *P. miersii*, quite different from *P. lætificata*, and a new variety of *P. lætificata* are described.

***Perichasma lætificata* Miers**

Ann. Mag. Nat. Hist., ser. 3, 28 : 22 (1866); Contrib. Bot. 3 : 219, tab. 123 (1871); PELLEGRIN, Fl. Mayombe 1 : 17 (1924).



Pl. 1. — *Perichasma latifoliatum* var. *latifoliatum* : 1A, leaf; 1B, ♂ inflorescence; 2A, ♂ flower; 2B, outer sepals; 2C, inner sepals; 2D, petals; 2E, 2F, synandrium; 3, T.S. of stem; 4, venation; 5, tannin sacs from the lamina; 6A-6C, T.S. through the lower, middle, and upper part of the petiole.

- *Stephania letificata* (MIERS) BENTH., in BENTH. & HOOK. f., Gen. Plant. 1 : 962 (1867); OLIVER, Fl. Trop. Afr. 1 : 47 (1868); TH. DUR. & SCHINZ, Consp. Fl. Afr. 1 (2) : 49 (1898); DIELS, in ENGL., Pflanzenr. 46 : 262, tab. 87 (1910); HUTCH. & DALZ., Fl. West Trop. Afr., ed. 1, 1 : 74 (1927); EXELL & MENDONÇA, Consp. Fl. Angol. 1 : 42 (1937); CHEV., Fl. Viv. Afr. Occ. Fr. 1 : 124 (1938); TROUPIN, Fl. Congo Belge et Ruanda Urundi 2 : 246 (1941); KEAY, Fl. West Trop. Afr., ed. 2, 1 : 75, tab. 28 c (1954).

Climber, stem ribbed, stout, woody, hispid, with a few scattered, stiff brown hairs. Leaf simple, alternate, petiolate, petiole ribbed, stout, hispid, 9-12 cm long, shorter than lamina, base of the petiole pulvinate and twisted, petiole inserted 4-4.5 cm from the base of the lamina, lamina peltate, large, ovate, apex acutely cuspidate, margin undulate, marginal crenatures rounded, base rounded, lower surface hispid particularly over veins, upper surface glabrous; lamina 17.5-22 cm long and 13-16 cm broad, palmately 8-9-nerved (usually 9-nerved), 5 upper nerves are more prominent, nerves more conspicuous on the lower surface, chartaceous (Pl. 1, 1A).

Male inflorescence (Pl. 1, 1B) very large panicle, 4 or more inflorescences arising from the same axil, 20.5-28 cm long; rachis ribbed, hairy, hairs long; rachis bears primary branches alternately; primary branches 0.5-6.5 cm long, surface hairy; primary branches bear secondary branches alternately which are 0.3-0.9 cm long, most of the secondary branches bear tertiary branches alternately, which are 0.15-0.35 cm long. Tertiary or secondary branches bear loosely arranged pedicellate flowers. ♂ *Flower* (Pl. 1, 2A) small, pedicellate; pedicel 0.85-1.5 mm long, flowers 0.9-1.5 mm long (without pedicel). Sepals 6, biseriate, unequal, free, obovate, margin entire, apex obtuse, base truncate, 1 central nerve visible, submembranous, outer sepals 0.7-0.8 mm long and 0.2-0.35 mm broad (Pl. 1, 2B); inner sepals 1.2-1.5 mm long and 0.6-0.7 mm broad (Pl. 1, 2C). Petals (Pl. 1, 2D) 3, free, angular obovate, base acute, apex rounded, margin slightly lobed, 0.65 mm long and 0.3-0.5 mm broad, lower portion darker, 1 central nerve visible. *Andræcium* (Pl. 1, 2E, 2F) : anthers 6, connate in a peltate synandrium, stalk 0.25-0.35 mm long, upper part of the synandrium 0.35-0.5 mm broad, anthers large, globular, without connective, dehiscing by apical, opercular valve which is supported by a columella-like extension of the filament.

ANATOMY

T.S. of the stem (Pl. 1, 3) shows the following structures: Epidermis is single-layered with a thick cuticle; epidermal cells contain tannin. Cortex very narrow, consisting of 7-8 layers of collenchymatous cells, some of the cells in the outermost cortical layer containing tannin. 13 vascular bundles of variable size are compactly arranged in a circle; the vascular bundles have 10-12-layered, sclerenchymatous, bundle caps; bundle caps of adjacent bundles almost join with one another to form a continuous sclerenchymatous ring; xylem well developed and endarch. Pith comparatively small and parenchymatous.

Petiole: T. S. of the lowermost part of the petiole (Pl. 1, 6A) shows the following structures: epidermis single-layered, epidermal cells have a thick cuticle on the outer side and contain tannin. Cortex consists of 10-13 layers of collenchymatous cells; some cells of the outermost cortical layer contain tannin. Vascular bundles 9; 4-5 of them are comparatively larger and lie on one side of the stele; each vascular bundle has a crescent-shaped, sclerenchymatous (7-8-layered) bundle cap. Medullary rays (6-7 layers thick) consist of thick-walled cells. Pith comparatively thick and parenchymatous; some cells of the pith contain needle-shaped crystals. T. S. through the middle part (Pl. 1, 6B) of the petiole shows similar structures but here 8 vascular bundles (4 comparatively larger) are present. The cortex is narrow and made up of 6-8 layers of collenchymatous cells. Crescent-shaped bundle caps formed of 5-7 layers of sclerenchymatous cells join with one another forming a continuous ring. T. S. through the uppermost part (Pl. 1, 6C) of the petiole shows similar structures but here no bundle cap is present. 8 vascular bundles (5 comparatively larger) are present. Some of the outer cortical cells contain dark brown crystals.

Lamina: Tannin is present in special tannin sacs (Pl. 1, 5) and in some of the lower epidermal cells. The tannin sacs are elongated, sac-like structures found just below the upper epidermis. Palisade ratio : the ratio of epidermal cells to palisade cells is 1 : 9.75.

Vein islets and vein endings (Pl. 1, 4) : The number of vein islets per sq. mm is 2.5 and the number of vein endings is 5.5 per sq. mm.

The stomata are anomocytic. Each lower epidermal cell is provided with a papilla. These papillæ sometimes contain some amount of tannin.

Long unbranched sclereids (fibro-sclereids) are present along the veins. These sclereids have tapering ends.

T. S. of lamina: Transverse section of the lamina shows the following structures :

Both upper and lower epidermis single-layered. Epidermal cells have a thick cuticle on their outer walls. Lower epidermal cells are provided with papillæ. There is a single layer of palisade cells below the upper epidermis. The palisade layer is interrupted by the presence of elongated tannin sacs, which are formed just below the upper epidermis and occur at more or less regular intervals. Just below the upper epidermis sometimes few cavities apparently without any content occur. Spongy tissue consists of 2-3 layers of horizontally arranged large parenchymatous cells. Some of the lower epidermal cells contain tannin. The vascular bundle in the primary vein region is provided with crescent-shaped sclerenchymatous cap on the upper and one of the lower side. Outside this sclerenchyma there are collenchymatous cells (Pl. 4, 18), but outside the sclerenchyma on the upper side there is a layer of crushed parenchymatous cells.

PALYNOLOGY

Pollen grains spheroidal to oblate-spheroidal, diameter 15.5-16.5 μm , triporate, isopolar, pores circular, exine 1.25 μm thick, reticulate, homobrochate, bacula pilate, united at the apex, free at base; sexine 1.5 μm and nexine 0.75 μm ; nexine thinner than the sexine (Pl. 5, 1, 2).

KEY TO VARIETIES

Margin of lamina with crenatures; petals angular obovate. 0.65 mm long and 0.3-0.5 mm broad; pollens homobrochate var. *lætificata*
Margin of lamina entire without crenatures; petals broadly obovate, 0.8-0.9 mm long and 0.9 mm broad; pollens heterobrochate var. *obovata*

var. *lætificata*

Margin of lamina undulate with rounded crenatures, lamina contains abundant tannin in tannin sacs. Inflorescence either from leafy or leafless parts; petals angular obovate.

DISTRIBUTION : Nigeria, Cameroon, Fernando Po, R.C.A., Angola, Republic of Gabon, Republic of Congo.

SHEETS EXAMINED :

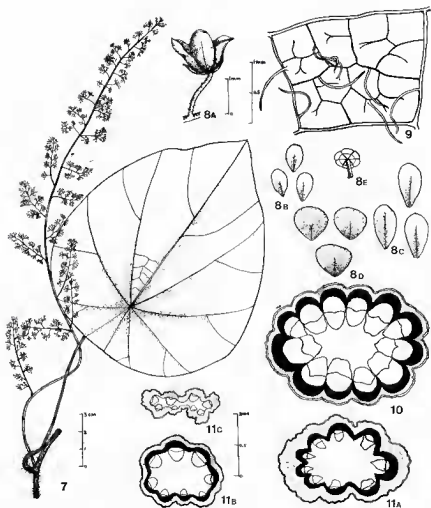
CAMEROON : Bipindi : Zenker US 767290, March 1917; Zenker US 764724; Zenker 3130, 1904, BM; Zenker 3485, 1908. — BELGIAN CONGO : Jean Louis 7668, 24.1.1938, BM. — R.C.A. : Boukoko : Tisserant 993, 21.1.1948, BM; 1055, 17.7.1948, BM.

var. *obovata* Kundu & Guha, var. *nov.*

A varietate lætificata petalis majoribus, late obovalis; foliorum marginibus plerumque integris, lamina saccis tanniferis destituta; pollinis granis superfice pergrossius reticulata; laminae transectione venis principalibus sclerenchymate vaginata differt.

TYPE : *Latilo FHI 30957*, 10.5.1952, Nigeria (holo-, FHI).

Stem ribbed, hard, solid, covered with long, brown, stiff hairs. Leaf (Pl. 2, 7) peltate, petiolate; petiole 8.2-13 cm long, more or less equal to the lamina, ribbed, solid pulvinate and twisted at base; hairs present at the basal and uppermost part, petiole inserted 1.8-2.4 cm from the base of the lamina. Lamina usually ovate, sometimes broadly ovate, margin entire or sometimes slightly lobed, base usually rounded; apex mucronate; upper surface glabrous, hairs present on the lower surface, palmately 9-10-nerved (upper 4-5 more prominent); lower surface paler than the upper surface, 8-13.5 cm long and 7.5-11.5 cm broad, coriaceous. Male inflorescence (Pl. 2, 7) axillary, solitary, pedunculate, panicle 21-35 cm long, rachis ribbed, slender, few hairs present, primary branches alternate 0.9-4.5 cm long,



Pl. 2. — *Perichasma latifcata* var. *obovata* : 7, leaf and ♂ inflorescence; 8A, ♂ flower; 8B, outer sepals; 8C, inner sepals; 8D, petals; 8E, synandrium; 9, venation; 10, T.S. of the stem; 11A-11C, T.S. through the lower, middle, and upper part of the petiole.

secondary branches alternate 0.3-0.7 cm long, each secondary branch bears at its tip a few branches, each of which in its turn bears a cluster of pedicellate flowers; ultimate cymulae loose. ♂ flower (Pl. 2, 8A) pedicellate, pedicel slender, few hairs present, 1.2-2.0 mm long; flower 0.9-1.2 mm long (without pedicel). Sepals 6, in two rows, free, outer (Pl. 2, 8B) 3 smaller, 0.7 mm long and 0.3-0.4 mm broad, obovate, margin entire, base obtuse, apex rounded, thin, 1 midvein present; 3 inner sepals larger (Pl. 2, 8C), 1.1-1.2 mm long and 0.62-0.75 mm broad, membranous, 1-veined, obovate, apex rounded, margin entire, base obtuse. Petals 3 (Pl. 2, 8D), free, 0.8-0.9 mm long and 0.9 mm broad, thin, broadly obovate, apex rounded, margin entire, base obtuse, 1 midvein present. Synandrium (Pl. 2, 8E) 0.5-0.75 mm long and 0.25-0.4 mm broad, anthers 6.

DISTRIBUTION : Nigeria.

ANATOMY

T. S. of the stem (Pl. 2, 10) shows the following structures : epidermis single-layered, outer walls of the epidermal cells highly cutinised, epidermal cells contain tannin, cortex narrow, 6-7-layered, collenchymatous, cortical cells contain tannin, 12 vascular bundles are compactly arranged in a circle. Sclerenchymatous bundle caps join with one another to form a continuous ring; bundle caps have 8-10 layers of sclerenchyma cells; pith parenchymatous.

T. S. of the petiole: *T. S. of the basal part of the petiole* (Pl. 2, 11A) shows the following structures: epidermis single-layered, outer walls of the epidermal cells highly cutinised, epidermal cells contain tannin, cortex collenchymatous, outer cortical cells contain tannin. 9 vascular bundles (4-5 of them smaller) are present, bundle caps present, joined together; pith parenchymatous. *T. S. of the middle part of the petiole* (Pl. 2, 11B) shows similar structures but here 8 vascular bundles (4 large and 4 small) are present. Bundle caps are well developed and join with one another forming a continuous sclerenchymatous ring. *T. S. of the uppermost part of the petiole* (Pl. 2, 11C) shows similar structure. 8 vascular bundles are present (3-4 small and 4-5 large), bundle caps absent, pith very narrow.

Lamina: No tannin sacs are found in the lamina. Upper epidermal cells have slightly wavy walls. The stomata present in the lower epidermis, anomocytic. Lower epidermal cells are usually provided with papillae and have wavy walls.

Palisade Ratio: The ratio of epidermal cells to palisade cells is 1 : 7.65.

Vein islets and vein endings (Pl. 2, 9) : The number of vein islets is 3 per sq. mm and the number of vein endings is 3.5 per sq. mm.

T. S. of the lamina: *T. S. of the lamina* shows structures similar to that of var. *laetificata*. But there are some differences such as:

No special tannin sacs are present below the upper epidermis. Few of the palisade cells contain tannin. The cavities below the upper epidermis are more frequent than those of var. *lætificata*. Sclerenchymatous caps associated with the primary veins are more developed. In the primary vein region the upper epidermis is thick-walled and 1-2 layers of cells just below it are also sclerenchymatous.

PALYNOLOGY

Pollen grains spheroidal to oblate spheroidal, diam. $\pm 15 \mu\text{m}$, triporate, isopolar; pores circular, not strictly defined, diameter ca $1.5 \mu\text{m}$. Exine $2.25\text{-}2.50 \mu\text{m}$ thick, retipilate; bacula tips swollen; sexine $1.5 \mu\text{m}$ thick, reticulate, heterobrochate; bacula apex united to form the ridges of muri, but they are free at the base, lamina more or less penta- to hexagonal; nexine appears to be unstratified, $0.75 \mu\text{m}$ thick, thinner than sexine, homogeneous (Pl. 5, 3).

This variety differs from *P. lætificata* var. *lætificata* in the following characters:

1. Petals broadly obovate and larger than the petals of var. *lætificata*.
2. Margin of lamina usually entire without crenatures.
3. Tannin sacs absent in the lamina.
4. Surface ornamentation of the pollen grains differs. Here the reticulation is much coarser and distinctly heterobrochate.
5. T. S. of the lamina shows that the main veins are almost surrounded by a sclerenchymatous sheath, whereas in var. *lætificata* sclerenchymatous caps are present only on the upper and lower sides of the vascular bundles.

Perichasma miersii Kundu & Guha, sp. nov.

Caulis costatus, lignosus, hispidus pilis longis sparsis flavido-brunneis. Folia simplicia alterna, petiolata, petiolis costatis hispidis, 4.8-7.3 cm longis, basi pulvinatis tortisque, supra basin ca. 1.6 cm insertis, lamina peltata, ovata, apice cuspidata, ad marginem aliquantum crenata, basi cordata, supra hispidula, infra dense hispida, 5.8-11.5 cm longa et 4.9-9.8 cm lata, palmatim 10-nervia, chartacea. Inflorescentia ♂ brevior sed magis patula, 20.8 cm longa, 26.5 cm lata, rachis costata lignosa, pilis paucis, ramus primarius costatus, percrassus, hispidus, alternus, lignosus, 6-19 cm longus, rami secundarii alternatim formati, costati, dense hispidi, comparate graciles, 1.5-13 cm longi, rami tertiarii graciles, hispidi, costati, 0.5-2.25 cm longi. Flores pedicellati in ramis secundariis tertiariisque; bractea linearis hispida, apice acuta, 7.5 mm longa; flores ♂ pedicellati, parvi, 1-1.8 mm longi (pedicello excepto, pedicelli pauci pilosi, graciles, 1-3 mm longi. Sepala 6-7, libera, exteriora ovata, 3-4, apice acuta, ad marginem integra, basi rotundata, 6.9 mm longa et 0.35 mm lata, uninervia, gracilia; sepala interiora 3, oblonga, apice obtusa, ad marginem integra, basi truncata, 2.5 mm longa et 0.9 mm lata, uninervia, gracilia. Petala 3, libera, angulata obovata, apice rotundata, margine integra sed supra lobata, basi acuta, crassa, 0.9 mm longa

et 0.5 mm lata, uninervia, nervo interdum cum duobus ramis lateralibus. Stamina 6 connata in synandrio peltato sursum 0.45 mm lato. Stipes 0.6-0.7 mm longus, connectivum fere nullum. Synandrium valva apicali operculi dehiscens.

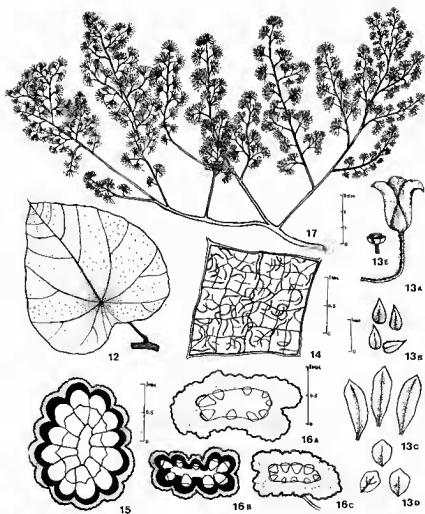
TYPE : Bates 1925, 1917 (holo-, MO 1608807).

Stem climber, ribbed, woody, solid, covered with long scattered, yellowish brown, hairs, very much hispid. Leaf (Pl. 3, 12) simple, alternate, petiolate, petiole ribbed, hispid, 4.8-7.3 cm long, shorter than lamina, base of the petiole pulvinate and twisted; lamina peltate, petiole inserted about 1.6 cm above the base. Lamina ovate, apex cuspidate, margin somewhat crenate, base cordate, upper surface hispidulous, hairs few, scattered; lower surface hispid, densely hairy; lamina 5.8-11.5 cm long and 4.9-9.8 cm broad, palmately 10-nerved (upper 5 more prominent), chartaceous. Male inflorescence (Pl. 3, 17) quite different from other *Perichasma* types; it is much shorter but more spreading, 20.8 cm long and 26.5 cm broad, rachis ribbed, woody, hairs few; primary branch ribbed very stout, hispid, alternate, woody, solid, 6-19 cm long, secondary branches formed alternately, ribbed, densely hispid, comparatively slender, 1.5-13 cm long, tertiary branches slender, hispid, ribbed, 0.5-2.25 cm long, secondary or tertiary branches bear loosely arranged pedicellate flowers; bracts present, linear, hispid, apex acute, 7.5 mm long. ♂ flower (Pl. 3, 13A) small, pedicellate, pedicel with very few long hairs, slender, 1-3 mm long; flower 1-1.8 mm long (without pedicel). Sepals 6-7, polysepalous, in 2 rows, outer sepals (Pl. 3, 13B) ovate, 3-4, apex acute, margin entire, base rounded, about 6.9 mm long and 0.35 mm broad, 1 central nerve visible, thin; inner sepals (Pl. 3, 13C) 3, oblong, apex obtuse, margin entire, base truncate, 2.5 mm long and 0.9 mm broad, 1 central nerve present, thin. Petals (Pl. 3, 13D) 3, free, angular obovate, apex rounded, margin entire but slightly lobed on the upper part, base acute, thick, 0.9 mm long and 0.5 mm broad, 1 central vein present which sometimes gives 2 short lateral branches. Stamen 6, connate in a peltate synandrium (Pl. 3, 13E), stalk 0.6-0.7 mm long, upper part of synandrium 0.45 mm broad, connective almost absent, synandrium dehiscing, by apical, opercular valve which is supported by columella-like extension of the filaments.

DISTRIBUTION : Cameroons.

ANATOMY

T. S. of stem (Pl. 3, 15) shows the following structures : the epidermis is single-layered with highly cutinised outer walls. Cortex narrow 7-8-layered, collenchymatous, some of the outer cortical cells contain tannin. 12 vascular bundles are present, each provided with a sclerenchymatous (8-9-layered) bundle cap; bundle caps unite to form a sclerenchymatous ring. Xylem well developed and endarch. Pith very narrow.



Pl. 3. — *Perichasma miersii*; 12, leaf; 13A, ♂ flower; 13B, outer sepals; 13C, inner sepals; 13D, petals; 13E, synandrium; 14, venation; 15, T.S. of the stem; 16A-16C, T.S. through the lower, middle, and upper part of the petiole; 17, ♂ inflorescence.

Petiole: Transverse section of the lowermost part (Pl. 3, 16A) of the petiole shows 9 vascular bundles, 4-5 of them are comparatively larger than the others. Epidermis is single-layered, outer walls of the epidermal cells highly cutinised and contain tannin; cortex is collenchymatous, outer cortical cells contain tannin; bundle caps are usually absent, but in some cases very poorly developed, bundle caps present over 2-3 larger vascular bundles only; pith parenchymatous. T. S. through the middle part of the petiole (Pl. 3, 16B) shows similar structures. But here the sclerenchymatous bundle caps are very well developed and join to form a continuous ring. Pith very narrow. T. S. of the uppermost of the petiole (Pl. 3, 16C) shows similar structures. But here no bundle caps are present.

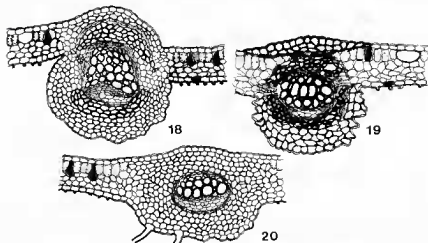
Lamina: Tannin cells are present. Long unicellular epidermal hairs are present on both surfaces. Stomata on the under surface are anomocytic. Palisade ratio: the ratio of epidermal cells to palisade cells is 1 : 5.71.

Vein islets and vein endings (Pl. 3, 14): The number of vein islets is 9.64 per sq. mm and the number of vein endings is 11.11 per sq. mm.

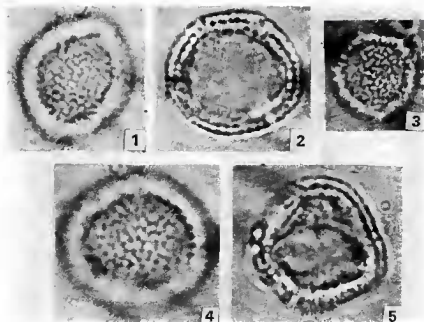
T.S. of the lamina: The structure is similar to that of *P. latifolcata*, but it has certain differences from the leaf of *P. latifolcata* such as: no sclerenchymatous cap surrounding the vascular bundle (Pl. 4, 20).

PALYNOLOGY

The size, shape and pattern of reticulation of the pollen grains of *P. miersii* are more or less the same as those of *P. latifolcata* var. *latifolcata* (Pl. 5, 4, 5).



Pl. 4. — T.S. of laminae: 18, *Perichasma latifolcata* var. *latifolcata*; 19, *P. latifolcata* var. *obovata*; 20, *P. miersii*.



Pl. 5. — Pollen grains : *Perichasma latifoliatum* var. *latifoliatum* : 1, reticulate surface; 2, optical section showing apertures and bacula. — *P. latifoliatum* var. *obovatum* : 3, pollen 3-aperturate faintly triangular in shape, reticulate surface. — *P. miersii* : 4, reticulate surface; 5, optical section.

Perichasma miersii differs from *P. latifoliatum* var. *latifoliatum* in certain features such as:

1. Much smaller leaf with cordate base.
2. Scattered hairs present on the upper surface of the leaf, lower surface densely hairy.
3. Much shorter but spreading inflorescence.
4. Longer pedicel.
5. Few very long scattered hairs on the pedicel.
6. Inner sepals oblong.
7. Number of vein islets and vein ending per sq. mm in the lamina is much higher.
8. Section through the middle part of the petiole shows very well developed bundle caps, which are united with one another.
9. Transverse sections through the basal part of the petiole show the absence of bundle caps.
10. Transverse section of the lamina shows that the vascular bundles are not provided with sclerenchymatous bundle caps.

DISCUSSION

Morphologically our observations agrees more or less with those of MIERS and these plants have many characters which are not found in *Stephania* such as:

1. Large peculiar inflorescence.
2. Presence of long, reddish brown hairs on stem, petiole, lamina and inflorescence.
3. Presence of tannin either in ordinary cells or in special tannin sacs.
4. Opercular dehiscence of the synandrium.
5. Connective almost absent.

All these support the retention of the genus *Perichasma*, but in our specimens the anther is not one-celled as described by MIERS.

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